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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,550	11/21/2003	Chih-Chun Yang	67,200-1109	3429

7590 02/14/2006

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EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 02/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/719,550

Applicant(s)

YANG ET AL

Examiner

Kin-Chan Chen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5,7,9-15,17,19 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,7,9-15,17,19 and 21-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 13-15, 17, 19, and 21-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 13, line 7, "without photoresist present" is new matter.

Any claim containing a negative limitation which does not have basis in the original disclosure should be rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. Ex parte Parks, 30 USPQ2d 1234, 1236 (Bd. Pat. App. & Inter. 1993). The mere absence of a positive recitation is not basis for an exclusion. Specification must clearly set forth an explicit definition. Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d985, 989 (Fed.Cir. 1999).

In claims 21 and 24, line 2, alkanolamine (or alkanolamines) is new matter. The disclosure does not support a broad meaning for the claim terms were premised on clear statements in the written description.

In claim 23, "dyglycolamine" is new matter.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1,2,5,9,10,12-14,17, and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 2003/0228990) in view of admitted prior art as evidenced by Chou (US 6,235,644), Shinohara (US 6,355,553) and Kadomura (US 5,227,337).

Lee et al. (abstract:[0001] [0061] [0086] [101], Table II of P. 19) teaches a process for removing residues from a structure. The structure may contain exposed tungsten [0001]. An oxidant solution (e.g., hydroxylamine) may be provided. The oxidant solution may be heated to about 80 degrees C from about 60 degrees C and applied to the structure. The disclosure of Lee is not limited to any particular structure but teaches remove the residues from the exposed tungsten. Hence, it would have been obvious to one with ordinary skill in the art to apply the process of Lee to the conventional process and product to remove the residues from the exposed tungsten in the art of semiconductor device fabrication. The admitted prior art (Fig. 1B to 1D; page 4, line 13 through page 5, line 9 of the specification) is only relied on to show the well-known tungsten etch-back process and product in the art of semiconductor device fabrication. The admitted prior art teaches that a tungsten layer may be provided, overlying a dielectric layer to fill an opening formed in the dielectric layer. A metal (tungsten) layer may be planarized (or etch-back processed without photoresist present) to form a metal

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plug structure and leave metal residues on the metal plug structure, see also Chou (US 6,235,644) in the record as evidence. Because it is a well-known process and product and because it is disclosed by admitted prior art, hence, it would have been obvious to one with ordinary skill in the art to incorporate said well-known process and product in the process of Lee in order to meet specific product requirement. As such, the combined prior art teach applying the oxidant solution to the metal plug structure to remove the metal residues. Since the oxidant solution is in contact with the metal residues, the metal residues comprising oxidized metal (tungsten) is expected.

As to dependent claims 2, 10, 14, and 21-24, Lee teaches said ingredients in the oxidant solution, see abstract,[101], and Table II of P. 19.

Claim 25 differs from the combined prior art by specifying conventional two-step tungsten etchback process to the art of semiconductor device fabrication. A person having ordinary skill in the art would have found it obvious to modify the combined prior art by using conventional process to same in order to reduce overetching and the loading effect with a reasonable expectation of success. See Shinohara (US 6,355,553; col. 3, lines 56-59; col. 10, lines 5-18) and Kadomura (US 5,227,337; Figs. 3a-3c and descriptions of these Figures) in the record as evidence.

4. Claims 3, 7, 11, 15, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee and admitted prior art as applied to claims 1,2,5,9,10,12-14,17, and 21-25 above, and further in view of Wolf (Silicon processing , vol. 1, page 51) or Verhaverbeke (US 5,972,123; col. 4, line 55 through col. 5, line 4).

The discussion of modified Lee and admitted prior art from above is repeated here.

The instant claims differ from Lee and admitted prior art by specifying using conventional spraying method to apply the wet etching /or cleaning solution. Wolf or Verhaverbeke is only relied on to show conventional spraying method to apply the wet etching /or cleaning solution. Because it is a conventional method and because it is disclosed by Wolf or Verhaverbeke, hence, it would have been obvious to one with ordinary skill in the art to use spraying method in the process of Lee and admitted prior art in order to efficiently carry out the wet etching /or cleaning process.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chou (US 6,235,644; col. 3, lines 39-47) teaches conventional tungsten etch-back process to form a tungsten plug structure. Shinohara (US 6,355,553; col. 3, lines 56-59; col. 10, lines 5-18) and Kadomura (US 5,227,337; Figs. 3a-3c and descriptions of these Figures) disclose the conventional two-step tungsten etchback process to the art of semiconductor device fabrication.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

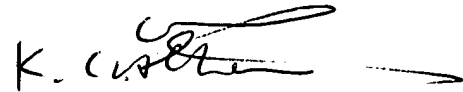
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you

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have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 9, 2006



Kin-Chan Chen
Primary Examiner
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